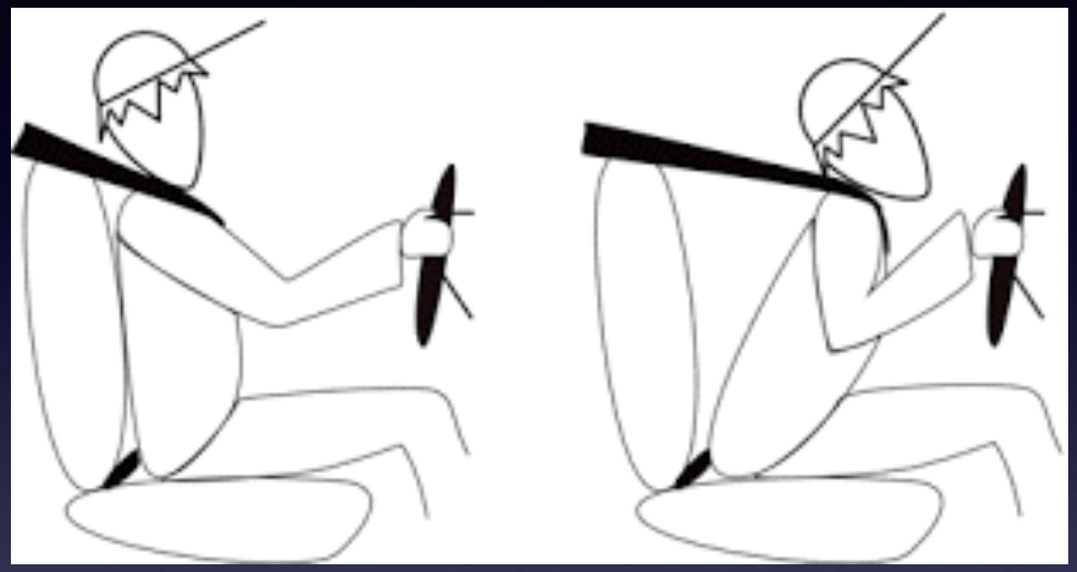
Newton's First & Second Laws

The relationship between force & mass

Newton's First Law

The English mathematician Sir Isaac Newton restated Galileo's ideas about motion in the first of hit three laws of motion.



Newton's first law of motion states than an object at rest will remain at rest, and an object moving at a constant velocity will continue moving at constant velocity, unless it is acted upon by an unbalanced force.

If an object is not moving, it will not move until a force acts on it.

Clothes on the floor will stay there until someone picks them up.

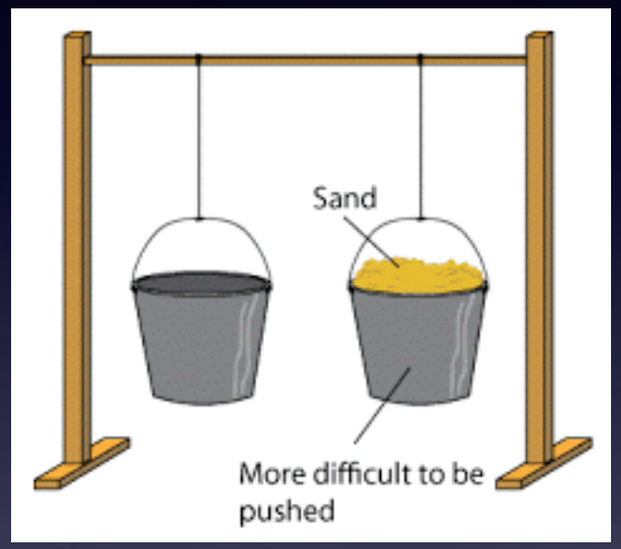
On Earth, gravity and friction are unbalanced forces that often change an object's motion.

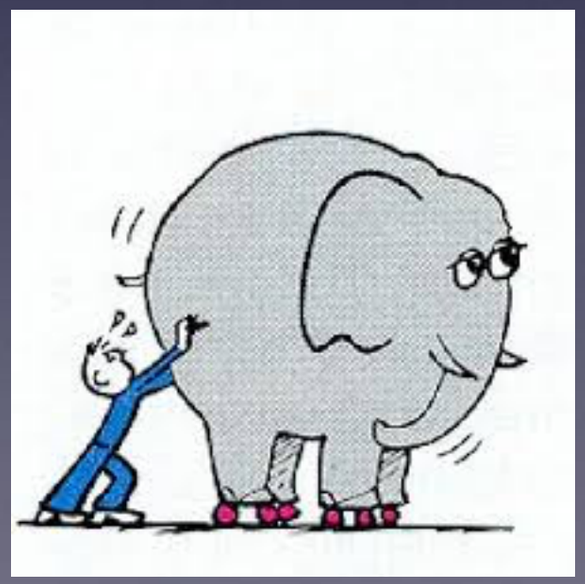
Inertia

Whether an object is moving or not, it resists any change to its motion. Galileo's concept of the resistance to a change in motion is called inertia. Newton's first law is also called the law of inertia. An object's resistance to a change in motion is called inertia.

Inertia explains many common events, such as why you move forward in your seat when a car stops suddenly. A force, such as the pull of a seat belt, is required to change your motion.

Inertia Depends on Mass





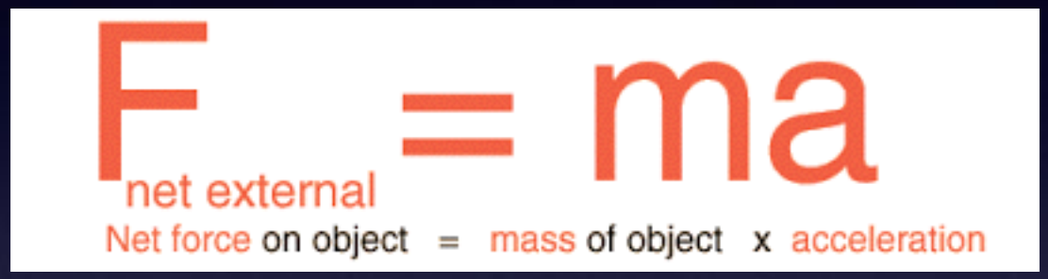
Some object have more inertia than others. The amount of inertia an object has depends on its mass.

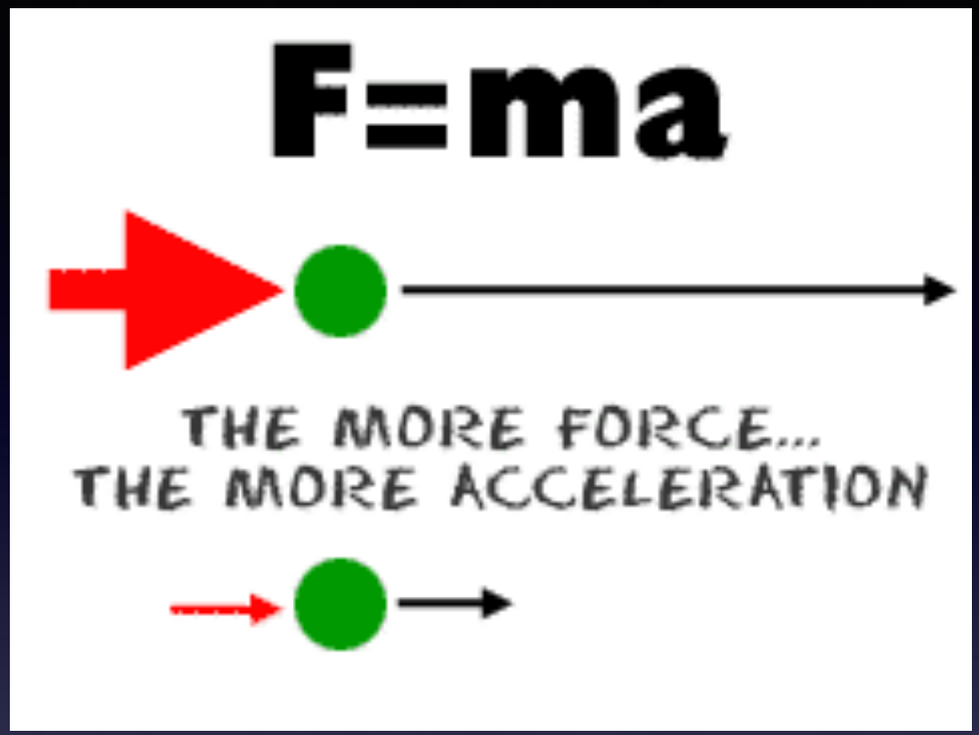
Objects with greater mass have more inertia, and require a greater force to cause a change in motion.

Newton's Second Law of Motion

Newton's second law of motion states that acceleration depends on the object's mass and the net force acting on the object. This relationship can be written in an equation:

Force = Mass X Acceleration





When acceleration is measured in meters per second per second (m/s_2) and mass is measured in kilograms, force is measured in kilograms x meters per second per second ($kg.m/s_2$).

$$1\ N = 1\ kg\text{-}m/s^2$$

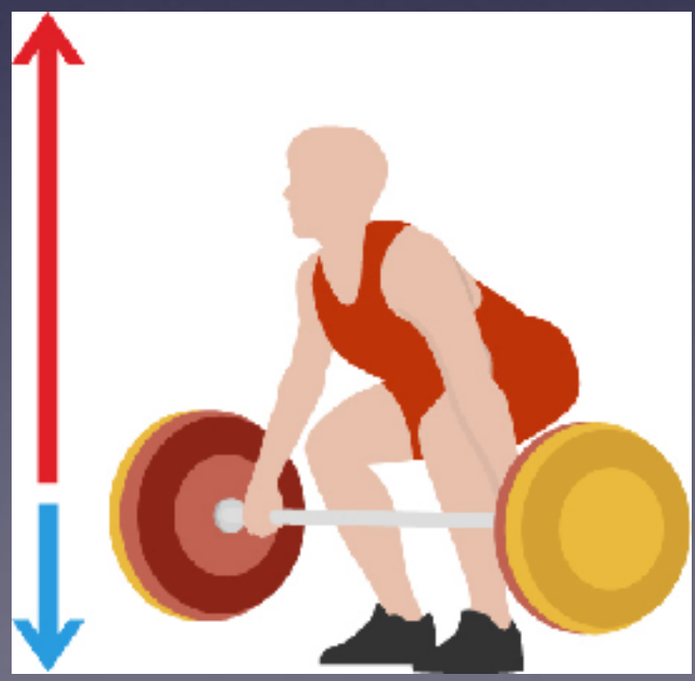
This unit is called the newton (N). One newton equals the force required to accelerate one kilogram of mass at 1 meter per second per second.

$1\ N = 1\ kg \times 1\ m/s_2$

Change in Force & Mass

The acceleration of an object will increase if the force increases. According to the equation, acceleration and force change in the same way – both get larger.

Another way to increase the acceleration is to change the mass. The equation also shows that the acceleration will increase if the mass decreases. Acceleration and mass change in opposite ways.



Keywords: English - Spanish

Newton's First Law of Motion
Primera Ley de Movimiento de Newton

Newton's Second Law
Segunda Ley de Movimiento de Newton

Inertia
Inercia